Exploring for Oil in West Texas — *Avery Johnson*

The HUMBLE WAY

MARCH-APRIL, 1952

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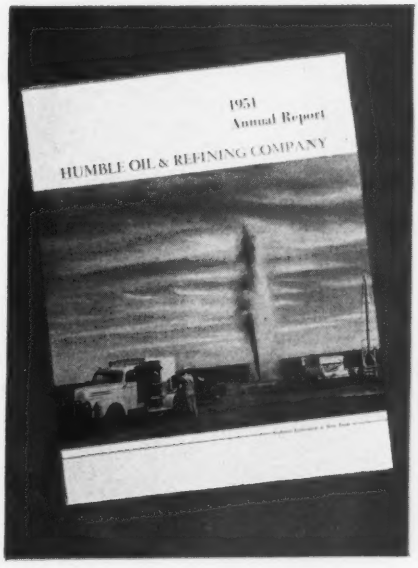
ANOTHER YEAR OF PROGRESS

Annual Report for 1951 shows continued growth as Humble helped meet record demand for oil

THE steadily growing demand for petroleum products provided the keynote for Humble's 1951 Annual Report, which was mailed early in April to stockholders, employees, and others. As President Hines H. Baker and Board Chairman L. T. Barrow said at the beginning of the report: "The petroleum industry is characterized by growth."

Humble's annual report contains ample evidence to support that statement. In fifteen years, demand and production have better than doubled. In 1951 alone, the American public's demand for oil products increased almost 10 per cent over the previous year.

Such rapidly increasing demands meant that Humble and the rest of the oil industry, already operating at a higher level than in World War II, had to spend record amounts to keep the nation supplied and to prepare for future needs. Humble's capital expenditures were at a record level of $158,794,000, an increase of $48,303,000 over 1950. For 1952, Humble plans an even larger program of capital expenditures which is estimated to cost $245,000,000, including all drilling.



Last year, the annual report points out, the Company's production of crude oil and natural gas liquids showed a gain of 23 per cent. Its daily production during 1951 of more than 370,000 barrels a day was two and a half times the annual average for the five-year period before World War II.

Humble produced in 1951 about five per cent of the nation's oil. Statistically speaking, the petroleum needed by one out of every twenty average consumers was supplied from a Humble well.

The Company showed similar gains in its other 1951 operations, all of which reflected the impetus of increased demand. There was a 25 per cent increase in trunk line deliveries

Landowner and landman get together to talk about an oil lease. Humble leases millions of acres, and only a small per cent proves productive. (See "The Big Search," page 9).

"The petroleum industry is characterized by growth . . ."

through its pipe lines. Refinery crude runs gained 11 per cent as Baytown Refinery processed an average of 10 million gallons a day.

IN 1951, for the first time, Humble became the leading marketer of gasoline in Texas, accounting for 16 per cent of the total tax-paid gasoline sales in the state. In other words, almost one out of every six Texas vehicles was fueled by Humble products.

Of particular significance to stockholders and employees was the fact that Humble, after 33 years of continuous progress, became a billion dollar company in 1951. This meant that the average investment in tools, equipment and facilities for each employee is about $60,000. At today's costs, it would take more than that to replace these facilities.

These enormous investments are necessary to provide the additional oil wells, the new pipe lines, the added refining capacity, and distribution facilities so that Humble can continue to do its share toward meeting ever mounting civilian and defense requirements. Before the end of 1952, Humble's postwar investment in such facilities will exceed a billion dollars.

THE unusually high level of demand for petroleum products, combined with Humble's expanded operations, resulted in a gross revenue of almost a billion dollars. Net income for the year was $169 million, second highest in the Company's history, with a substantial increase over 1950 reflecting

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Derrick at night blazes with light as Humble drilling crews work around the clock to keep pace with rising demand.

"The challenge of increased demand was successfully met . . ."

the larger volume of oil produced, transported, refined, and sold. Dividends were less than half of the income, while the remainder was reinvested in the business.

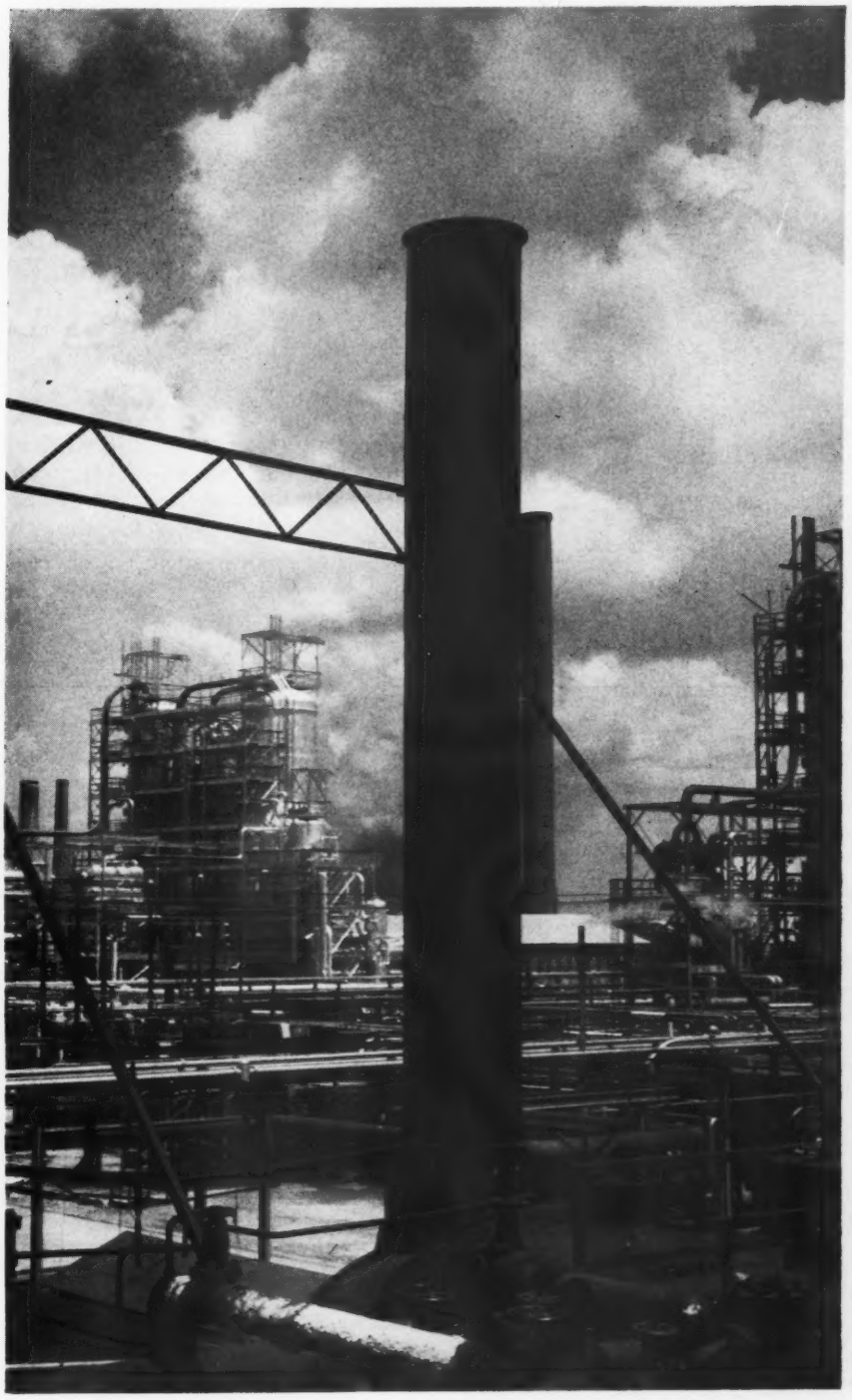
The letter to stockholders makes the significant point that "if current replacement costs had been used on plant and equipment alone, charges for depreciation in 1951 would have been about $24 million higher and net income that much lower." For many goods and services, the Company paid higher prices in 1951 that ever before.

An example of 1951 costs: Humble drilled 1133 wells at an average outlay of $81,500 each. By contrast, the average well drilled during the five-year period before the war cost only $23,600.

A CAREFUL reading of Humble's annual report reveals the story of a year of high achievement and consistent progress. The challenge of increased demand was successfully met. Increased facilities, provided by stockholder investment, were put to efficient use by a trained organization possessing a splendid spirit of cooperation.

The final paragraph of Messrs. Baker and Barrow's letter in the annual report drew much the same conclusion:

"The Board of Directors," the letter ended, "is appreciative of the confidence and support of the stockholders and the cooperation and teamwork of employees. Continued success in our common undertaking must have its basis in mutual understanding and good will."



New pipe still at Baytown, seen through old shell still to be dismantled, illustrates heavy investments in refining equipment.

THE ACID TEST

In both new wells and old, acidizing gives nature a big assist by etching out tiny flow channels for oil

IF YOU'VE ever visited the Carlsbad Caverns, you've seen a slow-motion version of one of the oil industry's most important techniques.

Carlsbad's hidden wonderland is encased in a huge block of limestone. Once the sediment from some ancient sea, this limestone slab was lifted high and dry during a ponderous upheaval of the earth's crust. Rain water later seeped into many of the cracks. While geology's slow clock ticked off epoch after epoch, this water patiently washed away at the limestone, dissolved much of it, and eventually tunneled out some of the world's most eye-bugging scenery.

Pretty much the same thing takes place every day in America's oil fields. But instead of water, acid is used. Instead of eating away great labyrinths, the oilman's corrosive fluid unclogs tiny flow channels. And instead of taking a few million years, the job is done in a matter of hours!

The technique is called acidizing. It is used wherever an oil-bearing formation is limestone or wherever nature has used an acid-soluble material to cement sand grains together. It's a workaday method of stimulating an oil well, one with none of the outward drama of a natural phenomenon like Carlsbad, but to oilmen—and consumers of oil—it has proved a tremendous economic boon. For at the cost of several hundred dollars, it can turn a marginal well into a profitable producer.

Suppose, for example, an operator drills a well into a limestone formation believed or known to hold oil. There may be plenty of oil down there, but the formation's permeability—or capacity to transmit fluids—may be such that only a few barrels a day (or perhaps none at all) will trickle out. That's when the operator is likely to sing out for an acid treatment.

Somewhere in the area will be a service company specially equipped to attack this underground problem—to put the well to its acid test. In a short time, its treating engineers will show up at the well with acid-loaded tank trucks. A portable pump is connected to the well. Then the acid—a thousand gallons, perhaps, but quite often several times that amount—is forced into the pay zone. Reacting with the carbonate material in the limestone, the acid cleans out and enlarges the flow channels. A not unusual result is a manyfold increase in the well's production of oil.

THAT, of course, is a highly simplified account of an acidizing job. It outlines the essentials, though, of a process which is used each year in hundreds of wells, both new and old, and which has been remarkably successful in stepping up the recovery of oil. In Humble's workover program, for instance, acidizing gives a production increase which more than pays out its cost in about three out of four jobs.

Every armchair scientist knows at least vaguely what acid is. If yours is a typical household, you're likely to have acetic acid (vinegar) in the pantry and citric acid (orange juice) in the icebox. Go to the medicine cabinet and you can probably find a bottle of boric acid (eyewash). But these are all weak acids—small boys, chemically speaking, which could never do a man's job around an oil field rig.

The acid prescribed for ailing wells (usually hydrochloric acid) is much stronger stuff. In its raw state, it could fast put a pump out of kilter or eat through the strongest steel casing. But the chemical engineers, as we shall see, learned how to make it behave some 20 years ago, and today's treating acids leave the well equipment practically unscathed.

How acid unclogs flow channels for oil is shown in schematic diagram at left. In this typical job, pumps force acid (shown in color) down the tubing and then out into acid-soluble formation through perforations in casing. Packer above, jelly seal below restrict acid to one zone.

All acids have certain common characteristics. They are soluble in water and taste sour. They turn the color of a vegetable dye called litmus from blue to red and react with their so-called bases (metallic hydroxides) to form salts and water. They all contain hydrogen, and the hydrogen ions are displaced when the acid hits most metals—copper, silver and gold being exceptions. The more these ions, or electrified particles, because disassociated from the acid, the stronger its effect.

More than half a century ago, scientists began casting about for a way to sting torpid wells into action with acid. A few bold operators tried some experimental injections in the Pennsylvania oil fields as early as 1894. Then in 1896 Dr. Herman Frasch, the man whose ingenious use of hot water revolutionized the sulphur-mining industry, patented a process for treating wells with hydrochloric acid. But the raw acid took a ravaging toll of well pipe, and the Frasch process won little commercial success.

Not until 1929 did the scientists come up with a workable method. They found that adding an inhibiting agent (an arsenic compound, say) reduced the corrosive action of hydrochloric more than 90 per cent. The inhibited acid, however, would still do a thorough job on limestone and other carbonate minerals. When a Michigan chemical company used this process to hike the output from its brine wells, the oil industry pricked up its ears. There were more experiments, added refinements, and three years later, in 1932, an oil well was successfully acidized at Muskegon, Michigan.

HYDROCHLORIC was a natural choice for the acidizers. Relatively cheap and readily available, it had long ago won its spurs as one of the most versatile of chemicals. For example, hydrochloric is used in the "pickling" of iron and steel, in the clean-off of surface impurities before metals are tinned or galvanized. It is used by the makers of glue, glucose, gelatine, dyes and many other items. It is also found in gastric juice of the human stomach (about an 0.3 per cent solution), where it helps digest proteins.

Hydrochloric's strong points with the oil well acidizers were these: When it comes in contact with oil, it forms no

12:30 P. M.—Timetable of 1000-gallon mud acid job on one of Humble's wells in Spraberry Trend gets under way with arrival of service trucks at this rig site.

1:45 P. M.—Acidizing equipment is now in place and hooked to the well. Behind cab of truck is pump used to force acid down tubing and out into the formation.

1:50 P. M.—Up on derrick floor, the acidizing engineer makes a careful check of all wellhead valves to see that everything is in order for the job to begin.

3:25 P. M.—After timeout for repair on rig, acidizer (left) and district engineer watch as connections are pressure-tested before acid is started down hole.

harmful or insoluble precipitates. It can be inhibited against corrosion. When it eats into limestone, the end products from the reaction are calcium chloride (soluble in water), carbon dioxide (like bubbles in a soft drink), and water. This means the dissolved limestone can easily be removed from the well as a fluid. Finally, if common-sense precautions are observed, hydrochloric is not a health hazard.

Over the years, the acidizers have found that a 15 per cent solution of hydrochloric in water works best in most formations. The weaker the acid, however, the less the cost, so if a limestone is unusually reactive, the solution may be watered down below the 15 per cent mark.

Other chemical agents besides the one which inhibits corrosion may be added to the solution. One agent, for instance, reduces surface tension and thus makes it easier for the acid to flow into the formation's pores. A demulsifying agent keeps the acid from forming an emulsion with oil. A retarding agent can be used to slow down the reaction rate, enabling the acid to move farther back into the formation before it becomes neutralized.

The size of an acid treatment may range from a 250-gallon "wash job," one used to clean the formation face, to a whopping 30,000-gallon job aimed at rejuvenating some veteran well grown listless with age. Older wells, the engineers have learned, ordinarily require heavier treatments than new ones.

NOWADAYS an acidizer will often stage his treatment. That is, instead of one large dose of acid, the well may get several progressively larger shots. For example: A thousand gallons of acid are pumped into the pay zone. When neutralized, the spent acid is swabbed out and followed up with 3000 gallons of fresh acid. This, too, is swabbed out after reacting with the formation, and then a final batch of 5000 gallons provides the Sunday punch. In this way, the theory goes, your old acid doesn't crowd into the formation ahead of the new. You get a deeper, more effective penetration.

In recent years, plain hydrochloric has undergone some chemical face-liftings to equip it for a wider variety of oil field jobs.

One of the relatively new variations

is mud acid, a mixture of hydrochloric and hydrofluoric acids which was developed about ten years ago to remove the mud cake from the formation face. Today mud acid is also used to clean out gun perforations, prepare a formation for squeeze cementing, to loosen stuck drill pipe, and to perform other similar jobs.

ANOTHER newcomer is channeling acid, an amazing product with some of the characteristics of a seeing-eye dog. This acid picks out the more permeable spots and then bores tiny worm-like tunnels back into the formation. It was originally developed for use on marginal wells where the cost of large volume acid treatments might be prohibitive. Channeling acid has a gelling agent which puts a film on most of the formation face. This retards the reaction rate. Some of the acid, however, follows the path of least resistance and flows into the larger pores which the film has left unblocked. The result is a number of tiny curving channels much deeper into the formation than could be obtained with regular acid.

Just the opposite effect is obtained with a product called Jel-Acid. This viscous fluid fills up the larger pores, and the regular acid used as a follow-up is cut off from what would otherwise be the path of least resistance. Forced to work on the denser part of the formation, the regular acid thus opens up new flow channels.

The mechanics of acidizing is a complete subject in itself. Suffice it to say, though, that the modern acidizer can spot his acid with uncanny accuracy.

In just 20 years, this important technique has left far behind the days when acid was merely dumped into a well and left there to do its job willy-nilly. Today it's a job for experts, and each acidizer must consider the chemical constituents of the problem formation and tailor his acid accordingly. Nor has the process reached a dead end. Acidizing has a record of steady progress, and further improvements will undoubtedly be made.

By giving Mother Nature a big assist, acidizing has made three significant contributions to our economy: more oil for the company, more money for the lease owner, and more fuel for the nation.

To scramble a metaphor, that's passing an acid test with flying colors!

4:17 P. M.—Acid has been pumped into well, and now the squeeze is on. Engineers keep sharp eye on gauge for pressure breaks which indicate formation is taking acid.

4:31 P. M.—It's all over but the swabbing. The acidizer buttons up his equipment, prepares to head for home. This well also got formation-fracturing treatment later.

Rear view of the new Midland office building shows a portion of the 120-car parking lot for employees. The air-conditioned building, constructed of salmon colored brick with blue-green terra-cotta trim between rows of windows, houses 190 employees.

A New Home In West Texas

HUMBLE'S 190 West Texas Division Office employees moved into a new home early in March of this year. On March 7, they joined with business leaders of the community and with friends and Company executives in formal opening ceremonies of the new four-story building.

On Thursday evening before the opening the Midland Office personnel met with the executive group from Houston at a banquet. President Hines H. Baker spoke to the assembly, outlining the growth of the Humble Companies and explaining their significant place in American industry.

At 11 o'clock on Friday morning the official opening ceremony took place. Derrickman Frank Wright, brought in for the occasion from a rig 14 miles away, near Stanton, handed a pair of silver shears to J. W. House, West Texas Division production superintendent. Mr. House in turn passed the shears to Mayor Perry D. Pickett of Midland who cut the ribbon formally signaling the opening of the building. A crowd of several hundred surged in through the glass doors and began guided tours of the structure.

Midland's Mayor Perry D. Pickett cuts the ribbon to officially open Humble's new four-story West Texas Division Office building. Left to right: Derrickman Frank Wright, who handed the shears to J. W. House; President Hines H. Baker; Mr. House (holding ribbon); Mayor Pickett; Director R. J. Gonzalez; Vice President A. E. Pecore, Humble Pipe Line Company; Humble Board Chairman L. T. Barrow; and Tom Tellepsen, contractor.

At a noon luncheon the Humble Companies entertained some 300 business leaders from Midland and other West Texas communities at the Country Club. Jack E. Wicker, president of the Midland Chamber of Commerce, welcomed Humble people and expressed the community's appreciation for the Companies' addition to Midland's growing skyline.

President Hines Baker pointed out that Humble has been a part of the West Texas oil industry for more than a quarter century. To assure the business leaders that the Companies have a continuing faith in the area, he announced that Humble's budgeted expenditures in the area for 1952 would be about $55 million.

The Big Search

Looking for oil to keep up with mounting demand has developed into the biggest hunt in nation's history

THIS country uses about 300 million gallons of oil a day—about 12½ million gallons every hour!

It takes that much oil to run our automobiles, airplanes, railroads, and other forms of transportation; to provide power for farm machinery; to heat homes and generate electricity we use in scores of ways; to provide the energy that makes our lives pleasant and comfortable.

Before we can get that oil or convert the energy from it to effective use, someone has to deliver it to us. Someone has to refine useful products from the crude oil. Someone else has to build and operate the pipe lines that carry crude oil to refineries. Still others have to produce it from oil wells and turn it into the pipe line systems.

But most important of all, someone has to *find* it. Not in the usual sense of the word "find," as if oil could be found like a wallet lost on a street corner or eggs at a school Easter egg hunt. The search for oil, which may lie buried miles below the surface, is the most difficult, hazardous, and expensive process imaginable. It takes billions of dollars every year, millions of man-hours of technically trained effort, millions of tons of materials and equipment to carry on that search.

It is a search that has developed into the biggest hunt in our nation's history—a search that scatters exploration crews across the length and breadth of our land. And behind those crews come wildcat rigs, drilling thousands of holes in the hope of striking oil.

The Search Must Go On

Each of us is vitally interested in the success or failure of those exploration crews and the wildcat drilling rigs. Just to stay even with current demand, the oil industry has to find 300 million gallons of new oil a day. If it fails, every one of us would soon run short of oil.

For oil cannot be planted and harvested from year to year from the same location. It can only be discovered and produced *once*. Long before one reservoir is exhausted, the search for new ones begins—for tomorrow's oil must be found today. And in the search, the industry takes its biggest risks—risks that make those in transportation, refining, and marketing seem small by comparison.

Where to Look?

The industry's first risk is the uncertainty of where to prospect at all. Not that it is hemmed in by geography—there is still plenty of land in this country not yet covered by oil exploration crews. But the catch is, where will the hunt begin? The industry collects the best information it can get before exploration dollars are spent in a new area. No operator can afford to shut his eyes, jab his finger at a map, and rush crews blindly out to "look over the

place." But at best, it is a calculated risk.

What every oil explorer longs for (since crystal balls are no help) is some pattern to follow; some trend of discovery. But there is little to guide him. Geographically, the discovery of oil in this country has followed about as straight a course as a Mexican jumping bean. It moves from one area to another and then back again, all over the map.

Some areas have cooled off for years, only to become hot again. Spindletop had a second boom nearly a quarter century after oil was first discovered on "the Hill." Many a time, one company has gone back over an area discarded by others, and found oil.

The oil industry takes leases on millions of acres a year in what seems to be oil country. Very few leases pay off.

Who knows where tomorrow's oil may be found? It may be discovered in the most unheard-of place—or it may crop up right in the shadow of today's derricks. That is the risk of the business: the risk of spending money to back up your belief that the next oil will be found at this or that particular place.

Leases Cost Money

Companies in the oil industry take leases on millions of acres each year in what seems to be oil country. These leases give the companies the right to explore further on the land and to drill wells. Obviously, the risks of acquiring leases is considerable. Unless oil is found—and the odds against that on any given lease are quite high—the company loses what it pays the landowner in bonus and rentals. Often, the loss runs into considerable money.

In 1950, for example, Humble leased a tract of 2,895 acres in a southeastern state, paying a bonus of $419,445 when the lease was signed. A wildcat well, drilled down to 14,395 feet, proved to be a dry hole. The lease was surrendered in 1951.

Humble at one time had more than a million acres of land under lease in another southeastern state. Not a drop of oil was found anywhere, and all the leases were dropped. Only one small field was discovered in a state neighboring on the "dry" one, and nearly five million acres in leases have been surrendered there since 1947.

These figures show that even a company as successful at finding oil as Humble, the largest domestic producer in the United States, can expect to find oil on *only a very small fraction of the leases it takes.* Yet, to stay in business, the Company has to take millions of acres in leases every year, even though it knows most of them will be unproductive. *The hitch is, there is no way of knowing beforehand which leases will produce and which will not!* The only thing to do is to take leases with the best possible information available, and hope for the best. Of all land now under lease in this country, it is probable that not more than one or two per cent will prove productive.

Competition among operators often bids the cost of leases up to high figures—especially if the land lies in a "hot" area. The amount of the bonus paid when the lease is signed may vary from less than a dollar per acre up to $1,000 or more an acre, depending upon the prospects of finding oil there.

After the bonus is paid, the landowner receives an annual lease rental until production is established or the lease is surrendered. Rentals on wildcat acreage may range from a few cents to a dollar or so per acre annually, but may run considerably more for attractive leases or in states where a set rental is prescribed by law.

Millions of dollars are spent every year on leases later surrendered—those from which no production was obtained, or on which wells were not drilled within a specified time.

Science Helps Locate Structures

Once leases are acquired, the next step is to send in exploration crews to look for likely structures. The chances are, a few structures will be found and they will be grade A, B, and C, according to the promise they show. In drilling them, however, the evaluation first made may be drastically revised. Some that looked good at first may bring forth nothing; some of the hazily-defined "C" prospects may prove to be productive.

The process of deciding where to begin work on structures found has undergone great changes over the years. In the old days, most wildcat wells were drilled on hunches. Rubbing their rabbit's foot for good luck, drillers of long ago would spud in a well wherever superstition and fancy led them. Perhaps their wagon had broken down on the spot, or an eagle had circled above them, or some unusual ground formation caught their eye. Many early oilmen swore by the forked stick, or "doodlebug," as an oil-finding device.

Occasionally, such a hunch or device paid off. But the nation's oil supply today would be small indeed if modern operators depended on signs and omens to locate their wells. Now they look to science—particularly to geology and geophysics—to help them locate subsurface structures and formations favorable to the accumulation of oil.

Geology began to be applied generally to the search for oil around 1915. "Rockhounds," as the petroleum geologists called themselves, could not *see* what lies below the surface, but the shape and pattern and nature of the rock formations above gave them some clue to what *might* lie below.

Across swamps, down creek-beds, and into the mountains they went—studying an eroded outcrop here, chipping away a bit of rock there. To them, a mountain was more than a mass of rock. In its cold stone they could read chapters of geologic history written millions of years ago. From folds and faults in rock strata, they could draw

Down creek beds go the "rockhounds," as petroleum geologists call themselves, searching for some surface clue that may lead to underground deposits of oil.

inference about where underground conditions might have been suitable to trap oil if it had been deposited there.

In the early 1920's, geophysicists joined geologists in the search for oil—first applying the principle of physics that sound travels at different rates in hard and soft formations. Nowadays, small explosions of dynamite set off sound waves, and equipment located at various points around the explosion measures the time required by the shock to be transmitted or reflected by underground formations. From the data supplied by these measurements, subsurface conditions may be interpreted before the well is drilled.

New methods have been devised for obtaining precise information on subsurface geology. Techniques for securing cores or samples of the section being penetrated permit careful study of the fossils and correlation with similar studies on other wells. Readings of geologic conditions throughout the depth of a well by means of electric logging and radioactive logging provide detailed information not otherwise available. Recently a dipmeter has been developed which measures the angle of inclination of the sediments penetrated by a well, thereby providing clues as to what may surround the well.

Many new inventions are adapted to the search for oil. Aerial mapping has provided a quick method of surveying large areas which might be difficult to cover by conventional methods. Special aerial photographs when viewed with a stereopticon permit measurement of topographic features in three dimensional relief. Airplanes have also been used for rapid application of some geophysical techniques to large areas.

Techniques of geology and geophysics as oil-finding sciences have improved greatly in our time. Apparatus, methods, and interpretation have all been improved. But risks remain great—for all exploration can do at best is point to places where it is *likely that oil may have accumulated,* not to where oil *is*. Even the drilling bit sometimes fails to give the right answer! It is easy—too embarrassingly and expensively easy—to drill right through a good oil formation and never know it was there. In earlier years, some of the fields ranked as important today were missed in precisely that manner.

In short, oil operators have made and continue to make the fullest use of science in their search for oil. And even so, drilling in new territory remains one of the most expensive and most risky of businesses. Deeper drilling means more expense, and the search for oil is leading into deeper formations.

BASIC ODDS AGAINST THE OIL EXPLORER

1. Acquiring leases in what seems to be oil country.
   Odds { Probably not more than two to five acres in every 100 acquired will prove productive.
2. Finding on those leases structures where oil may have accumulated.
   Odds { Out of many areas surveyed, at a cost as high as $1,000 a day for a seismograph crew, only a few will prove to have promising structures.
3. Drilling wildcat wells.
   Odds { Nine to one against bringing in a producing well. Forty-five to one against that well bringing in a field with a million barrels or more of oil.
4. Defining limits of field discovered by the one successful wildcat.
   Odds { Many dry holes will be drilled even after oil is found.

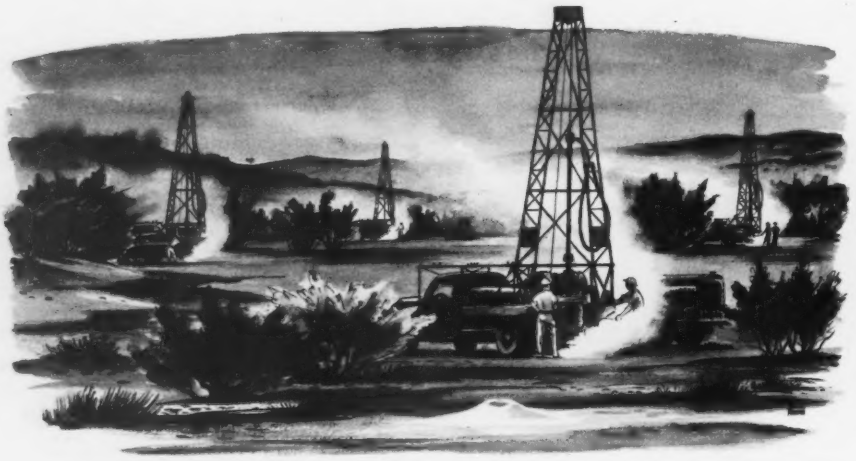
SUMMARY: For every six producing wells, the industry drills about four dry holes and has to spend large sums on leases, exploration, and drilling.

Drilling Wildcat Wells

The final exploration tool is the drilling bit; geology and geophysics can only indicate structures where oil and gas might exist. The bit serves not only to determine whether oil actually exists, but also to provide additional geologic information. By inspection of fossils in samples of some of the materials penetrated by the drill, the formation can be identified and its position related to that in other wells. Sometimes, wells are drilled for geologic information only.

Wildcat wells are expensive, any way you look at them. Average cost of wildcats for many companies is more than $100,000 apiece—but in many cases, the companies would have been glad to settle for that. Many a million dollar dry hole has taken its place on the record books of the larger oil companies, underscoring the great risks which operators must be prepared to take.

Only *one out of nine* wells drilled in the search for new fields in this country finds any oil or gas, and *only one out of five* of the discoveries finds a field with as much as a million barrels of oil. Of *all* the wells drilled in this country—including those drilled in proven fields—more than one well in three is a dry hole. The prospect of spending perhaps $100,000 or more apiece for eight dry holes before striking oil is enough to make most canny investors shudder! And there is no assurance that a prospector's luck will be that good. One drilling contractor, who drilled a hundred wells for others, took a financial interest himself in 75 of



Four shot-hole rigs in West Texas drill holes for explosives. Exploded at same time, charges set up vibrations that may give clues to kind of structures below.

Scientific devices, like the gravity meter being used above in Southwest Texas, have greatly aided industry in search for oil.

Laboratory work is an indispensable part of the search for oil. Portable lab, below, makes tests at well location in the field.

Paleontologist uses experienced eyes to examine fossils present in bit cuttings. Fossils help determine accurately the type of material the drill has penetrated.

those wells. Every one of the 75 was a dry hole! His fortunes took a turn for the better, however; he finally hit production in Scurry County.

Sometimes it works just the other way around. A man gets a good start, works up to a fortune, and loses it later. One operator in Dallas, who is reported to have been a multi-millionaire a decade or so ago, was wiped out by 63 dry holes in a row.

Defining Limits of Field

Assume that an operator has average luck and drills one producing well out of his nine wildcats. The work has just begun. He still doesn't know how big the field is; more than likely, it will be small, for only one of 45 wildcat wells finds a field with as much as a million barrels of oil. To find out how big his field is, or to define its limits, the operator has to drill other wells in the vicinity.

More often than not, the work will prove discouraging. Take the case of an independent producer in a central Texas county. He hit a producer on his first try in a wildcat area. Then he drilled in every direction, hoping to extend the field. He missed every time. Every well but the first was dry. He had a one-well field!

Even though the field discovered by the wildcat well may be large enough to support several wells, the operator is going to have to drill some dry holes in defining the limits of the field. Using the example of a million-barrel field, the operator would probably end up with something like this: Six or seven producing wells, along with from three to five dry holes. For even with all the caution an operator can muster, a disappointingly large number of his wells will be dry, even in a so-called "proven area." It is no job for the weak-willed and faint-hearted. Wildcatting can lead to heartbreak and bankruptcy faster than it can lead to riches.

The odds are stacked against the wildcatter—odds against his leases proving productive; against his finding good structures; against his producing oil from those structures; against his finding a really good field when a wildcat is successful in striking oil; *against everything he does in the search for oil.* In the light of such odds, it is impossible for all producers to be as fabulously rich as they are portrayed in song and story.

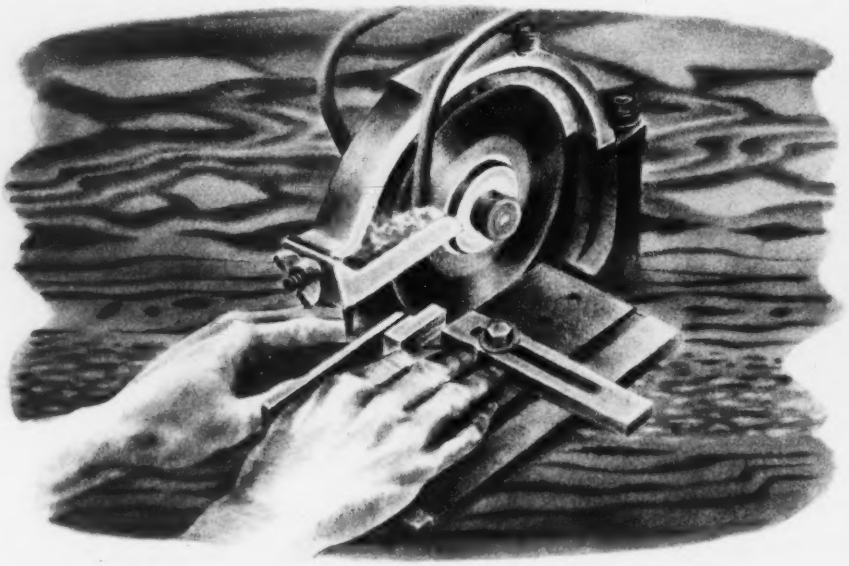
Keep Present Incentive

In spite of these facts, the riches from oil have been highly over-emphasized. Actually, only a few of the lucky operators ever "hit the jackpot" and get rich from oil. Only the spectacularly successful ones are written up in the headlines. Failures fade away and are never heard from. And they are in the great majority; for every spectacular success, there are scores of failures.

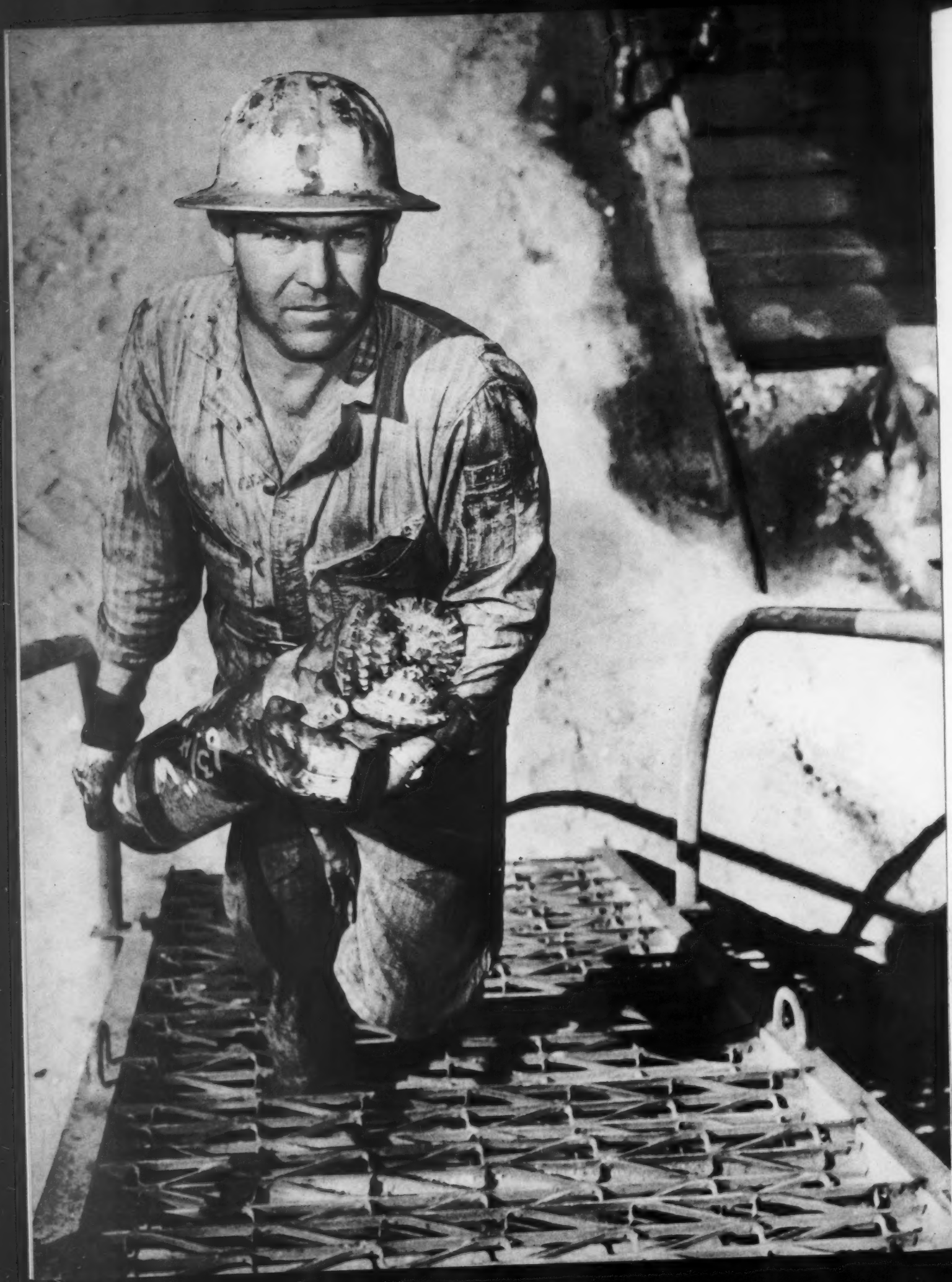
One thing, however, we can be sure of: As long as there are men who are willing to take risks and have enough faith in themselves and their knowledge of the business to take long-shot prospects at "striking it rich," this nation is in no danger of running out of oil. To insure that there always will be such explorers and to maintain their interest, there must be some incentive for them to hunt at all—some chance at a return on the oil they do find at great cost, effort, and risk.

If that incentive—that opportunity to make a return on investment and risk-taking—remains as it is today, oil will be found to keep our gasoline tanks filled, our wheels turning, our factories and mills humming, our standard of living high, and our nation secure.

Slices of rock, cut thin and then polished to less than the thickness of a sheet of paper, are used in microscopic examinations by the Geologic Research Section.



The final exploration tool is the drilling bit. Wildcat drilling rigs follow exploration crews into marshes, plains, and mountains in hope of finding new reservoirs of oil.



MORE BITE TO THE BIT

Jet rock bits are taking many bumps out of oil's rocky road to paydirt

Model bit used in Humble laboratory is little more than inch in diameter. Here part of rock has been chipped off to show how drilling fluid jets from bit onto bottom of hole.

IN THE waning days of World War II, a new type of aircraft—one powered by a jet engine—made its battle debut. Today the jet age has arrived in the air. You don't hear as much about it, but the jet age has also arrived underground.

Jet bits are to the oil industry what the supersonic plane is to flying. They get to the target faster. Since their introduction, the jets—which use high velocity streams of mud to sweep aside cuttings—have helped whittle large hunks of time off drilling schedules. Field records have tumbled right and left.

On one West Texas lease last year, Humble's jet-equipped crews lowered the field record three times. A rig working with jet bits in North Texas figured it would have taken 36 per cent longer to drill its well with conventional bits. Over in Mississippi, another Humble rig reported a 40 per cent increase in rate of penetration. Out in California's Castaic Junction and Rosedale fields, the jets helped cut some rocky drilling time by 17 per cent.

Why is this so important? Well, running a rig nicks a company anywhere from about $1200 to $2000 a day. Save a day, and you've taken some of the sting from the high cost of drilling. And when you consider that jet bits can whack as much as 50 per cent off rotating time—sometimes even more, depending on the formation—you begin to see the significance of this tool with the mighty bite.

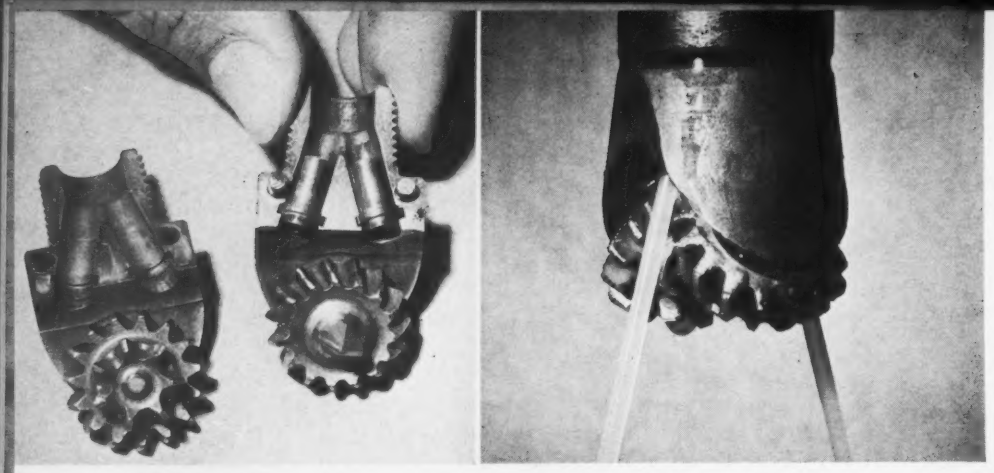
As a valuable by-product, the jet bits have also produced more footage per bit—48 per cent more, for example, in California. This means fewer round trips for bit changes, less time-consuming operations where the entire drilling string must be brought out of the hole. It also means fewer bits per well. By using jets, the North Texas rig mentioned lowered its bit consumption 42 per cent. Not at all uncommon, says a national trade journal, is a one-fourth reduction in the number of bits used.

Jet bits get their name from the high-speed jets of mud which whisk cuttings out of the bit's way and accelerate their climb to the surface. With an uncluttered well bottom, the bit can get a better bite. First to appear on the scene was the jet drag bit. Originally a product of Humble research, this bit has almost completely replaced the old style "fishtail" bits. A more recent candidate for drilling honors has been the jet *rock* bit. It too is meeting with phenomenal success.

Both types of bits, the drag and the rock, look pretty much like the bits which rotary rigs have used for several decades. With old style bits, however, the drilling mud flows directly onto the bit's cutters at a relatively low velocity of 20 to 80 feet a second. With jet bits, it whooshes out at velocities as high as 500 feet a second.

A small change, this, but it works wonders with drilling efficiency. There is no recutting of cuttings and hence less tendency for the bit to ball up.

Crewman carries a jet rock bit up the stairs of a Humble drilling rig. In recent years, this tool with the mighty bite has made great headway.



Tiny jet bits which can actually drill through rock are used in Humble's laboratories. At left is a disassembled bit. At right, glycerine is being squirted through the jets.

Other key drilling factors can also be boosted: the rotating speed, for instance, and the weight carried on the bit. The latter, indeed, has been upped to 40,000 pounds—four times the usual weight carried on some sizes of bits.

HUMBLE pioneered the use of jet bits as the result of a research project which got under way several years ago when it found that a large part of the energy available from the mud pumps was being wasted. Humble felt this energy could be utilized in performing useful work in making hole faster. Several changes in bit design had to be made in order that this new-found energy could be used in making hole and not in destroying the bit. Out of the company's laboratory and field tests came a workable jet drag bit, the progenitor of the entire jet bit family. From there the bit manufacturers took over. (The full story of jet drag bits was told in "They Drill Faster" in THE HUMBLE WAY, May-June 1951.)

The new drag bit lost little time in making a name for itself. It was used to drill up to five times faster than conventional bits through shales and sands of the Gulf Coast.

Humble's engineers didn't stop there. The same idea, they reasoned, could be adapted to improve rock bit cutting.

In conventional rock bits, the mud flowed down the drill pipe and gushed out through a watercourse in the center of the bit. It then flowed right across the cone-shaped cutters. In the new jet rock bit, the center watercourse was eliminated. New mud outlets—either two or three nozzles in all—were placed along the sides of the bit. These nozzles were choked down so the mud would zip through at a much faster clip than it did in conventional rock bits.

The new bit underwent its baptism of fire on an East Texas rig. Eight days were lopped off the rig's drilling time. More tests followed, and records continued to fall. In 1950 the test rig cut its average drilling time per well by 31 per cent from the year before. The jet rock bit had definitely proved itself.

Since then, the big difficulty with jet rock bits has been their short supply. It was fairly simple for manufacturers to convert their standard drag bits into jets. Tooling up for jet rock bits was a more complex undertaking. That's why many of the jet rock bits now in use are of the "sub" variety. The watercourse of a conventional bit is plugged, and the bit is then screwed onto a jet "sub," a short piece of heavy pipe equipped with jet nozzles. However, production of integral jet rock bits is now rapidly increasing.

On all of Humble's wells last year, about one-third of the rock bits used were jets. This figure will undoubtedly soar—perhaps past the 90 per cent mark—as more and more integral jets become available.

ENGINEERING data on jet rock bits is still in the process of being compiled. For instance, it was formerly believed the jets would require additional slush pump power; most engineers now feel that present pump power, properly applied, is sufficient in most cases. Recent tests have also indicated that best results are obtained if nozzle velocity is kept above 250 feet a second. It has been found, too, that while jet rock bits give only a small increase in drilling rate in extremely hard formations, they may lengthen bit life there as much as 100 per cent.

Jet rock bits are going great guns in many of the harder formations, but they are not a satisfactory substitute where jet drag bits can be used. "As a general rule," says one engineer, "any formation that can be drilled with a drag bit can be drilled more economically with a jet drag bit. Any formation suitable for a rock bit can be drilled more economically with a jet rock bit."

To jet bits—along with other technological improvements—must be credited much of Humble's success in holding down drilling costs during a highly inflationary period. As always, though, the drilling crew factor still stands out like a derrick on a bald prairie. No economic chain is any stronger than its human links.

Jet bits have taken many of the bumps out of the rocky road to paydirt, but every accomplishment in the field still depends on how well every driller and his roughnecks do their job with the tools at hand.

Toothless bit (right) was once as shiny and sharp as its mate, but two feet of drilling through some West Texas chert took all the bite from its three cones.

Bronze plaque, presented to Baytown Refinery by National Safety Council for best safety record for 1951, is viewed with pride by Vice President H. W. Ferguson and Plants Manager G. L. Farned. The refinery also won top safety award in Texas.

OUR SAFEST YEAR

HUMBLE employees have made their jobs about the safest in the oil industry.

For every million hours worked during 1951, they had only 3.19 disabling accidents. Industry-wide figures for companies participating in the National Safety Council's annual Petroleum Section competition show an average of 6.8 disabling injuries.

By setting this low accident record employees of the Humble Companies wrote their finest chapter in the Company's safety history. The 3.19 accident rate for last year was 22 per cent better than the previous year's record and 45 per cent better than the Company's average of 5.85 for the five-year period between 1946-50.

It was the Refining Department which set the pace for the Humble Companies. Baytown Refinery's low accident rate of 1.37 disabling injuries per million hours won for that group the National Safety Council and the Texas Safety Association first honors for the year. No other major refinery in the United States equalled that record.

All other departments, however, contributed materially to Humble's low accident experience. The Production Department and the Gas Division had the second best records respectively in national competition. In drilling operations only two companies had better records than Humble.

In the annual statewide competition sponsored by the Texas Safety Association, Humble won five of the six 1951 awards made to major oil companies. First place awards were won by the Refining, Production, Sales, and Exploration Departments and by the Gas Division.

"The Company's enviable safety record for 1951," one safety engineer said, "is the cumulative result of a company-wide safety program which was started in 1929. At that time employees were suffering 43 disabling injuries for each million hours worked. Through an organized safety program to which Company management has given impetus and employees have given constant support, this high frequency rate has been gradually reduced to the present low of 3.19."

The program has been carried on in the form of a three-pronged attack against personal injury on the job: 1.

Safety equipment used at Baytown Refinery includes all articles pictured here. On front row: safety goggles, cleaning equipment, and shields; second row: respirators and gas masks; third row: gas detectors, flash lights, salt tablets, protective skin cream and hand cleaner; fourth row: gloves, plastic and metal safety hats with winter liner; fifth row: heavy duty coveralls, asbestos fire suit, and first aid kits; sixth row: rubber boots, safety shoes, rubber apron, derrick belt and tail line. The long box in front of man contains fire blanket. In box at top left is fresh air mask; box at top right contains oxygen breathing apparatus.

Education and training to develop in the employees and supervisors a constant safety consciousness; 2. Provision of necessary safety equipment to protect employees; and 3. Constant vigilance by all employees to detect and remedy hazards on every job.

Through the years the training effort has taken the form of frequent and regular safety meetings. In field operations foremen hold short safety meetings every tour before starting work.

In addition to such meetings, printed safety information is made available to each employee. He is shown how to do his job safely and is frequently reminded of the need for safe working habits.

A monthly publication on safety is sent to all supervisors to give them guide material for discussing safety with employees. This publication carries details of accidents suffered and feature material for "on the job" discussion. The purpose is to make it possible for employees to learn from the experiences of others how best to avoid injury.

Along with this educational program the Company for years has put great stress on the use of safety equipment. In fact, Humble has been a leader in the use of safety shoes, goggles, safety hats, and a great variety of other protective equipment.

That this emphasis on safety equipment has merited the attention given it is proven by actual results. Toe injuries, which once accounted for 20 per cent of all Company accidents, have been reduced to less than two per cent since the program was started. In like manner, eye injuries scarcely find a place on the accident list since employees have been sold on the value of protective goggles.

The third prong in the attack on accidents has been one of technical vigilance. Here the design engineer has taken his place beside the safety engineer, unitizing equipment and incorporating safety factors into basic design. Supplementing this design work has been the constant watch of safety engineers and safety conscious employees for safety hazards. This alertness has paid dividends in the form of safer tools, more carefully engineered equipment, and greater safety consciousness on the part of employees.

Still another facet of the Company's improving safety picture is the continuing driver training program started in 1950. Something like 60 million miles a year are clicked off by drivers of Humble cars and trucks. Such a high exposure to today's traffic conditions brought accident frequency up to an alarming level. In search of a remedy, management directed the Safety Division to develop a complete driver training course for employees. Response was enthusiastic; results have been impressive.

Safety meeting is attended by all members of a drilling crew just before going on shift. Such sessions help reduce accidents by keeping crew men safety-conscious.

Since the program was started two years ago about 7,000 employees have taken the course, and automotive accidents have been reduced by 43 per cent. That has brought the accident frequency rate of the Humble fleet down to a point 71 per cent below the national rate for vehicle accidents in the petroleum industry.

So effective has this program been that current plans call for a follow-up driver training program every year.

The automotive record and the general safety record show that with wholehearted management approval and support, safety-minded employees and supervisors can eliminate most of the accidents that once plagued industry. That is particularly true if the entire organization has the benefit of a continuing training program, adequate safety equipment, and safe tools and working conditions.

There can, however, be no relaxing of safety efforts, no resting on laurels, as safety engineers are quick to point out. A possible accident is in the making at almost every turn whenever carelessness creeps in.

To All Humble Employees:

The Management of the Humble Company derives great satisfaction from the outstanding safety record established by employees during 1951. Such a splendid safety experience is further proof of the fine relationships that exist through all levels of the organization. It evidences an alertness and concern for the safety, health, and efficiency of fellow employees, and a wholesome spirit of mutual helpfulness. It is a genuine pleasure to commend you for this outstanding achievement and we are confident your continued safety efforts will result in greater attainments in the future.

Hines H. Baker,
President

Thirteen Employees Retire

One has more than 32 years' service; ten have at least 29 years' service

THIRTEEN long-time employees have retired since THE HUMBLE WAY last reported. Ten of these have 29 or more years' service, while two have 26 years with Humble and one has 19 years. Milton F. Moffett, chief accountant of Crude Oil Accounting in the Houston Office, has the longest service period among those retiring with his more than 32 years' service.

Humble Pipe Line Company—Charley H. Ayres, district gauger at Cisco, retired April 2 after 30 years' service. He started with Humble as a laborer. All of his service with the Company has been spent in the North Texas Division. Mr. Ayres likes fishing and traveling. During retirement, he plans to spend some time raising flowers in his yard.

August J. Muller, division superintendent of Southwest Texas, retired March 16 after more than 29 years' service. Mr. Muller started with Humble as a clerk in charge of oil accounts at Cisco. Later he worked as dispatcher, chief clerk, and division assistant to the superintendent and superintendent. He was named to this last job in 1950. Golf and hunting are his chief hobbies. He will make his home in Corpus Christi on retirement.

Irwin F. Pettey, district superintendent at Mexia, retired February 27 after more than 31 years' service. He was employed at Navasota as an engineer. Other places he has worked during his career with Humble are McCamey, Ingleside, and Luling. He owns a home in Luling, where he will live during retirement.

Asa I. Taylor, gauger at Hull District, retired February 20 after 32 years' service. Almost all of his service with the Company has been spent as a gauger. Deer hunting and dominoes are his hobbies. During retirement, he plans to raise a garden at his home in Beaumont and participate more in his hobbies.

Production Department—Alexander P. Eves, rotary driller at Grand Island, retired February 28 after 29 years' service. Except for seven months spent as a rotary helper at the start of his career with Humble, Mr. Eves has been a rotary driller. He is the second oldest driller for the Company in point of service. For his hobbies he raises registered Beagle hounds, hunts, and experiments in the development of a better Brahman-type cow for small southern farms. On retiring he plans to operate his sugar cane farm and raise livestock.

Frank Jousan, Jr., lease pumper-gauger at Galveston Bay, retired December 5 after 19 years' service with the Company. He was employed at Thompsons and later worked at Raccoon Bend, Dickinson, and Galveston Bay. In January, 1951, he won a Coin-Your-Idea award for suggesting an improvement in making daily production gauges of stock tanks. His special interest is fishing. He plans to raise a garden and chickens at his home in Sealey, Texas.

William C. Price, pumper at Wink District, retired March 9 after more than 29 years' service. He started to work for Humble at Mexia as a roustabout. He since has worked at Wortham, Judkin, and Wink. His hobbies are hunting and fishing. He plans to participate in these hobbies more and raise flowers and a garden at his home in Monahans, Texas.

Harry E. Siler, compressor plant operator and gauger at Thompsons, retired March 20 after 29 years' service. Mr. Siler began work with Humble at Pioneer as a tool dresser and later worked in various capacities at Cisco, Eastland, Albany, Powell, Wortham, Mexia, Kosse, Hurdle, Big Lake, Yates, Pyote, Sugarland, and Thompsons. Hunting and fishing are among his hobbies. In retirement he plans to move to East Texas and raise a garden and a few cattle.

Ellis E. Williams, district superintendent at North Crowley, retired February 11 after more than 30 years' service. Mr. Williams began his career

Employees Recently Called to Military Service

AIR FORCE	
Bailey, William DeWitt	Goose Creek Production
Gregory, Johnnie Gayle	Maurbro Production
Hodge, William Daniel	Production Accounting, Houston
ARMY	
Blann, Jack Richard	East Texas Division Office, Tyler, Production
Bleker, Julius William, III	Exploration-Geophysics, Texas
Davidson, Gene Alan	Potash Production
Hoke, Robert Jack	Galveston Bay Production
LeBoeuf, Dalton Paul	Exploration-Geophysics, Louisiana
Martin, Bobby Ray	Louisiana Division Office, Production
Murphey, Lascom Edwin, Jr.	Bayou Sale Production
Owen, William Murl	Hawkins Production
Rice, Jesse Lee	Katy Gas Cycling Plant
Sandlin, Herman Lee	Exploration Geophysics Research, Houston
Taylor, Robert Lewis	Louisiana Division Office, Production
Webster, Harris Connor	Stationery, Printing, & Reproduction, Houston
MARINES	
Ferebee, John Clement	Service Station No. 379
Gipson, James Robert	Tomball Production
McLendon, Donald Clarence	Proration, Contamination, & Statistical, Houston Pipe Line
NAVY	
Curry, Jack Edwin	Baytown Refinery
Lenz, Lester Lee	Exploration Geophysics, Texas
Moore, Robert William	Scott & Hopper Production
Nicholson, Thomas H.	Land Records & Rentals, Houston
Russell, William Jarrell, Jr.	ETGP—American Gas Plant, Overton
Sullivan, Bruce Millen	East Texas Division Office, Tyler, Production
Thumann, Calvin Eugene	Stationery, Printing & Reproduction, Houston

with Humble at Hull as a rotary helper. He was made district superintendent in July, 1941, at Potash. He is an enthusiastic duck hunter and fisherman. He plans to spend some time with his grandchildren and at his Gulf-shore home. He will also maintain his home in Beaumont.

Baytown Refinery—Boykin L. Thomasson, helper, retired March 4 after 26 years' service. Mr. Thomasson started to work in the Boilermakers Department. He spent his service at the Refinery in various departments, retiring in the Distillation Department. His hobbies are fishing, hunting, and flower raising. He will spend some of his time in retirement caring for his home in Baytown.

Vernard V. Webster, pipe machine operator, retired March 17 after more than 26 years' service. Mr. Webster began work at Parkersburg, West Virginia, in the refinery on July 3, 1924. On June 2, 1936, he transferred to Baytown Refinery. All of his service at Baytown has been in the Pipe Department. Mr. Webster became interested in travel as a teacher and director in the New York State Vocational School and has travelled extensively in the United States and Mexico.

Houston Office—Milton F. Moffett, chief accountant in Crude Oil Accounting, retired February 25 after more than 32 years' service. During World War I, Mr. Moffett served with the Ordnance Company of the 42nd Rainbow Division and the General Administration Division of the Office of Chief of Ordnance, A.E.F. He worked for the Santa Fe Railway at Cleburne, Texas, before joining Humble in a clerical capacity in Production Accounting. Mr. Moffett was assigned to the General Auditor's Office in June, 1921, where he helped divorce the records of all crude oil transactions from the Production Department's books to set up a Crude Oil Department. On completion of this work, he was named the first head of Crude Oil Accounting Office, where he remained until his retirement.

Helen S. Stephens, checking clerk in the Purchasing Department, retired April 17 after 30 years' service. Mrs. Stephens worked as a royalty clerk for the Natural Gas Department of the Standard Oil Company of Louisiana at Shreveport before joining Humble Pipe Line Company in 1924. She began with the Company as a field order invoice clerk in the Houston Office. She transferred to the Purchasing Department in 1947. She likes sewing and singing and is a former member of the Humble Glee Club. She has spent recent summers traveling in the United States, South America and Canada. On retirement she starts a trip to San Tome, Venezuela, about 70 miles from Caracas, capital of Venezuela. She will visit her son, an assistant manager of economics of the Eastern Division of Mene Grande Oil Company at San Tome.

Deaths

Since the last issue of THE HUMBLE WAY, ten active employees and three annuitants have died.

Active employees who have died are: James V. Adamson, 56, roustabout gangpusher at London, on February 27; Edward G. Blanton, 53, mechanical supervisor at London, on February 24; Lionel L. Bouska, 39, lease pumpergauger at Maurbro, on March 25; Robert L. Carter, 49, chief clerk at Baytown Refinery, on March 19; Anderson Godfrey, 56, laborer at Baytown Refinery, on February 24; George T. Lowther, 44, senior division clerk in Southwest Texas Division Office, on March 4; Samuel C. Moore, 58, maintenance man at Abilene Bulk Station, on February 11; William W. Roan, 52, laborer at Baytown Refinery, on March 7; Francis C. Orndoff, 34, pipeliner at Ector Station, on March 9; David Young, 62, engineer at Alice, on February 17.

Annuitants: William E. Dykes, 54, boilermaker first at Baytown Refinery before his retirement, died on March 14; Theodore J. Gensler, 66, engineer at Bateman Station before his retirement, died on March 9; Math G. Houston, 73, tank maintenance and repair foreman at Baytown Refinery before his retirement, died on February 21.

Practical Ideas Pay Employees $15,440

Humble employees continue to prove the time-honored adage: "There is always a way to do a job better." Evidence of their success is found in the amount of money paid by the Central "Coin-Your-Ideas" Committee during the fourth quarter of 1951.

Booklet prepared for employees explains how CYI Plan works, encourages ideas.

There were 329 awards made on 280 ideas submitted by Humble employees for a total of $12,820. That's an average of $45.79 per idea.

Supplemental awards during the same period, paid for exceptionally good ideas put to work during the past year, amounted to $2,620. There were 21 awards made on 21 ideas for an average of $124.76 per idea.

More Benefits Under Medical Insurance Plan

Humble's Group Hospitalization and Surgical Benefits Insurance Plan has been amended, effective March 1, to provide additional and more liberal coverage for employees and their dependents.

The benefits under the amended Plan are now more in line with current medical costs.

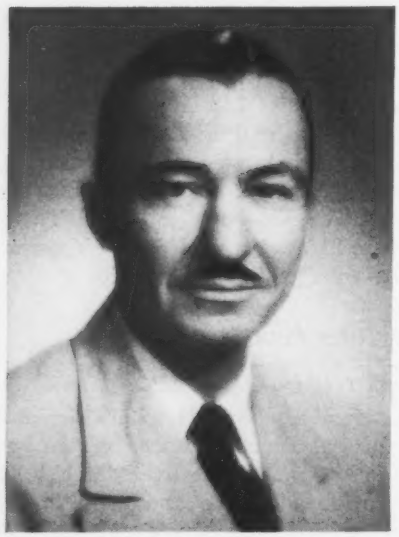
Humble absorbs a portion of the additional premium cost of the new, expanded Plan by increasing its monthly contributions from $1 to $1.50 for each employee participant.

By the way . . .

President Baker Honored

Hines H. Baker, president of Humble Oil & Refining Company, on March 27 was awarded the 1952 good citizenship gold medal by the Sons of the American Revolution.

Ewing Werlein, president of the organization's Paul Carrington chapter, Houston, made the presentation at the chapter's annual Bill of Rights dinner, attended by more than 900.



• **MORGAN J. DAVIS,** Humble vice-president and director in charge of exploration, is the new president of the American Association of Petroleum Geologists. He became the association's thirty-sixth president during its recent joint meeting with the Society of Exploration Geophysicists in Los Angeles.

• **NEW PARAXYLENE PLANT—** A new addition to the petro-chemical industry in Texas' Gulf Coast area is Humble Oil & Refining Company's projected new paraxylene plant at Baytown Refinery. Construction will begin in September, and completion is scheduled for May 8, 1953.

Paraxylene, one of the raw materials for the new synthetic fiber, Dacron, is separated from mixed xylenes by a special process developed by Humble research engineers. It is expected that more than two million pounds a month will be produced at the new plant.

Dacron fiber, which resembles wool and is competitive in price, has been praised by clothing manufacturers for its water-repellency and wrinkle-resistance.

Some xylenes occur naturally in crude oil, but the major supply is produced synthetically through a complex refining process. Humble's experience with them began when Baytown Refinery supplied an unprecedented amount of 100-octane aviation gasoline during World War II.

The HUMBLE WAY

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Published every other month for employees and stockholders

HUMBLE OIL & REFINING COMPANY

P. O. Box 2180, Houston 1, Texas

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Jet rock bit, which uses high velocity streams of mud to sweep aside cuttings, has helped whittle down drilling time. (See "More Bite to the Bit," page 17).

Tribute to a Neighbor

We'd like you to meet a neighbor on whom both of us depend.

He's the man who operates the service station in your neighborhood.

You depend on him to take care of your car, to supply you with products of high quality at reasonable prices. You expect, and get, from him more *free service* than from any other merchant with whom you do business: whatever you spend, he cheerfully cleans your windshield, checks your oil and tires, furnishes you with free battery water, and renders special services as you need them.

The oil companies depend on him as the independent merchant who distributes their products. He demands, and receives, continuously improved products with which to compete with his business rivals. He insists on reasonable prices that will move his merchandise in volume. His progressive attitude is one of the chief reasons why the oil industry has supplied you with better products at about the same prices over a long period of years.

It's a pleasure to pay this tribute to a neighbor, to thank him publicly for being such a friendly, dependable contact between the oil industry and its millions of customers. He is not on our payroll, but we couldn't do business without him.

HUMBLE OIL & REFINING CO.
HUMBLE PIPE LINE CO.

(This advertisement is one of a series which has been appearing in Texas newspapers and magazines. Similar advertisements were also published in other states in which Humble carries on operations.)